MEDICAL EXAMINER.

DEVOTED TO MEDICINE, SURGERY, AND THE COLLATERAL SCIENCES.

No. 12.] PHILADELPHIA, SATURDAY, MARCH 20, 1841. [Vol. IV.

ORIGINAL COMMUNICATIONS.

On the Tincture of Iodine in Frost-Bite. By D. M. Wright, M. D.

To the Editors of the Medical Examiner.

On looking over the pages of one of the late numbers of the American Medical Library, I was struck with the singular efficacy which was ascribed to the use of the tinct. of iodine in erysipelas, burns, furuncle, chilblains, and other varieties of inflammation; and coming from so respectable a source as it did, I determined to give it a trial where an opportunity should permit. A few days after I was consulted by a couple of seamen, who, having been exposed in the recent very severe weather, were suffering greatly from frost-bite. The hands of one of them were much swollen and rincated, the ends of the fingers quite insensible, and a feeling of numbness in the whole hand. A painful prickling sensation was produced by pressure, which also vibrated; great quickness in the capillary circulation. The pulse at the ends was remarkably full and strong; but this activity seemed confined to the wrists; the patient did not have general fever. The other did not suffer so violently; his hands, however, were much swollen, and quite painful. I directed their hands to be dipped in hot water, and a strong tincture of iodine brushed over the inflamed part twice a day. A few applications were sufficient to relieve entirely the one who suffered least severely; and the other, by persevering in the treatment about a week, is now quite relieved. His hands pealed all over; and the nails from three of his fingers are detached; a new skin formed above as readily as the old pealed off, and his hands are now as fair and delicate as a lady's, his fingers perfectly flexible, quite sensitive, but without soreness, and the nails are beginning to form in the fingers from which they were detached; no other treatment has been resorted to in the case. I have seen but few cases of frost-bite, and none so severe as the above described, and have ever found it very tedious and difficult of cure; I am convinced had I been acquainted with the efficacy of the above named remedy, I should have had much less difficulty. I would recommend it to the notice of your readers, and am convinced that one trial of it will cause them to discard all other remedies in such cases.

I am satisfied that iodine is not fully appreciated as a remedial agent, and I was much pleased to see its claims as an internal remedy set forth in a recent number of your paper. I think it is destined shortly to become a very useful and popular remedy. I am informed by my friend, Dr. Charles E. Johnson, a practitioner in a neighbouring village, and a gentleman in whose judgment and veracity all reliance may be placed, that he is in the habit of using it frequently in combination with sulph. quinine in cases of intermittents in which there are visceral engorgements, and which have resisted the ordinary methods of treatment, and that the practice has been unusually successful. He thinks the combination is admissible in many cases in which the quinine separately would not be borne, and that its administration may often supersede the necessity of resorting to mercurials as alteratives. The tincture was of the strength recommended in the dispensatory of Wood and Bache.

Edenton, N. C., March 8th, 1841.

Case of palpitation of heart—hypertrophy of left ventricle—enlargement of kidneys—diabetes—death from anemia. Communicated by Dr. Ashmead.

David R. Corson, of New Hope, æt. 24; height six feet two inches; grew very rapidly-but enjoyed excellent health, with the excep, tion of occasional attacks of intermittent fever, and slight erysipelas of the face, to which he was subject for several years, and which continued till his death. In 1834 he suffered considerably from palpitation of the heart; and in 1835 commenced the study of medicine, which confined him very closely, and produced great debility. In February, 1836, his weakness induced him to try active exercise; the effort was followed by hæmoptysis, for which he was freely bled by Prof. Wood, and in ten days was able to return to New Hope in tolerable health, but greatly reduced. He resumed his studies, rode out occasionally, but preserved a pale and cachectic aspect till the summer of 1837. At this period the extraction of a tooth was followed by profuse hæmorrhage, which continued for eight or ten days, and induced such extreme prostration that he was not able to raise his head from the pillow; twenty pounds of blood were supposed to have been lost in two weeks. From this shock he appeared never fully to recover, although his appetite and strength returned in a measure. In the month of September, of the same year, he removed a portion of his uvula, which was elongated, and the operation was followed by great hæmorrhage; in the fall of 1837 he again attended the lectures of the University of Pennsylvania, and graduated with much credit in the spring of 1838.

Upon his return home very much enfeebled, he resumed exercise on horseback; his pulse became very frequent, and he occasionally expectorated a little blood, which appeared to exude from the fauces, and was unattended by cough or pain in the chest, but was connected with frequent ecchymoses of the white of the eyes.

During the winter and spring of 1838–'9, he occasionally attended to practice, but spent the summer of the same year on a farm, using gentle exercise every day, yet his general debility and paleness gradually increased, although his appetite was good, and he himself free from pain, cheerful, and offering no other evidence of disease.

During the spring of 1840 he suffered from an attack of intermittent, which lasted for eight or ten days, and was followed by a relapse, accompanied by violent pain in the bowels, great prostration, with a dark red inflammation of the palate, and oozing of blood from the gums. During his convalescence he exercised his sight very intensely for three days in fine carving, and was suddenly attacked during the night with pain in the head and loss of vision; in a few weeks he was slowly convalescent, and started for Schooley's Mountain, where he remained more than two months with gradual improvement. On his return in the fall, after an attack of diabetes, he frequently rode twenty miles a day; his vision improved so far that he could read ordinary print, but his diabetes increased; the urine was neither saccharine nor albuminous; for this affection he used elix. vitriol, cort. cinchonæ, carb. ferri, and exclusive animal diet.

The amount of urine gradually reached six quarts in twenty-four hours; it was of a pale straw colour, limpid, free from peculiar odour, and not coagulable by heat or nitric acid. The appetite remained unimpaired till within a few days of his death; but the thirst increased, until at last the craving for cold water became insatiable; the blood was so impoverished, that after cutting his finger, his white handkerchief was scarcely stained.

During the last year of his life, every pulsation of the aorta and of the arteries of the extremities was so distinctly felt by the patient, that he imagined the existence of an aneurism in the abdomen.

Although sensible of his situation, his cheerfulness did not desert him, and his intellect remained unimpaired to the end; he was only confined to his room for the last two weeks.

During several months his pulse was 96 while lying down, and rose while erect; on the day before his death it was 104; the weakness gradually increased till it became extreme, and conveyed to him the sensation of over-exhaustion from violent running; it was accompanied by slight spasms on one side of the body, and just before his death by moderate pain in the back, loss of appetite, and occasional vomiting; yet the breathing was never hurried, and he died January 29th, 1841, apparently from extreme debility.

Autopsy, Jan. 31st, sixty hours after death.—Weather cold; no discoloration of skin from gravitation of blood; no appearance of decomposition; limbs rigid; surface of an alabaster whiteness and transparency; slight œdema of hands; small ecchymosed spots on chest and shoulder.

Subcutaneous fat ¼ inch thick on thorax and abdomen.

Muscles of chest and abdomen quite florid and firm.

Peritoneum contains half a pint of deep yellow, cloudy serum; external appearance of abdominal viscera natural.

Stomach largely distended with three to four pints of fluid and a little gas; the whole mucous membrane is studded over with patches about ¼ inch in diameter, of a dark brown colour, except on the anterior surface, which was not in contact with the fluid contents; in this portion similar patches exist, but offer a bright red colour; they all appear more like ecchymosed spots than the result of an injection of the vessels, but exist in, and not under the mucous membrane. This latter is rather thinner and less consistent than natural.

The *mesenteric glands* very numerous and enlarged, of a dark gray colour, with a tinge of red, offer to the eye and touch a flaccid appearance, giving the idea of a previous greater enlargement and subsequent shrinking; they contained no pus.

Small intestine. Mucous membrane of natural colour and consistence. The glands of Brunner are numerous—some of them the size of a pin's head, pale and firm. The glands of Peyer are thickened, of a grayish colour, darker than the mucous membrane.

The duodenum, and six or seven feet of jejunum presented externally a light bluish gray colour; this continued after the contents, of a similar colour, were removed, and the mucus washed off; on close inspection it was clearly seen by the naked eye, to be produced by innumerable, very minute, distinct, dark blue points, which were uniformly strewed over the surface; these appeared to be in the substance of the mucous membrane, and were not removed by slight scraping.

When these points are carefully removed with a knife or the nail, the mucous membrane is perfectly white, smooth, and healthy. Were they in the mouths of the villi? Were they particles of carb. ferri or iod. ferri, exhibited about two weeks before death?

Large intestine. Glands of Brunner numerous; vermiform appendix much thickened, of a dark colour, and slightly ulcerated on the under surface; descending colon and rectum covered with numerous small ecchymosed spots.

Liver natural size; colon reddish; texture rather soft, not fatty; red and yellow portions very distinct, and in natural proportion; the red

considerably injected; very little blood in the large vessels; the biliary ducts contain a bright yellow bile; there spots are found in the centre of the liver, the size of marbles, of a grass green colour; elsewhere natural.

Gall bladder. Moderate size, filled with a ropy bile, of a dark brown colour, which stains a white basin of a bright golden yellow.

Spleen very small, three by four by one inch, very firm, and almost bloodless.

Kidneys surrounded by much fat, large; the left is the largest, five and a half by two and a half by two; opaque white thickened patches are found in the fibrous coat, which separates with great facility; beneath these are seen large ecchymosed patches on the surface of the kidney; renal arteries size of crow-quills; veins four or five times this size—their diameter in a flattened state is half an inch. Pelvis and ureters not dilated or enlarged; lining membrane firm, but ecchymosed. The whole substance of the kidney is firm on pressure; urine accompanied by a thick white (puruloid?) secretion exuded from the papillæ, but remained perfectly distinct from each other; the whole substance of the kidney was charged with urine, which streamed out on cutting or tearing its substance; tubular portion quite pale, and very distinct from the cortical; this latter, at first sight, appeared universally injected; the appearance was due to vessels loaded with dark blood in the interstices of which the acini were pale.

Bladder natural; contains several small coagula of blood, and a pint of very pale, thin, almost inodorous urine, not coagulable by heat; mucous membrane unaltered.

The *mediastinum* presents large ecchymosed spots.

The *pleuræ* contain two and a half pints clear, light yellow serum, with a tinge of red; no flocculi or signs of recent inflammation.

The *lungs* present numerous large ecchymosed spots on their surface; they are loaded with serum, and at their base are moderately congested with blood; extensive emphysema of edges and apex; bronchial tubes slightly injected; no tubercles.

The apex of the left lung is adherent, and presents a shrivelled appearance and undue firmness; on laying it open, about one dozen calcareous deposits are found from the size of a pea down; these are contained in cysts, lined by a white shining membrane, and crumble readily on pressure.

The *pericardium* contains eight ounces of reddish serum; surface smooth, shining, of a light rose-colour, ecchymosed, but containing no lymph.

Heart large, covered with large ecchymosed spots, and surrounded by a considerable degree of fat, especially at its base. *Measurement* at base of ventricles, circumference twelve inches, from base of ventricles to apex five inches; no marks of recent or former inflammation on the surface.

Right auricles large; lining membrane slightly thickened; orifice of coronary vein and opening into ventricle larger than usual; right ventricle contains a white coagulum, but no blood; parietes firm, and rather thicker than natural; its cavity has fully twice its natural capacity; tricuspid valve, when cut open, measures six inches along the line of its attachment; semilunar valves and pulmonary artery unaltered.

Left auricle about same size as right; but the osteum venosum is not enlarged unnaturally.

Left ventricle very large; contains neither blood nor coagulum; parietes very firm and dense, not fatty, rather pale; has a thickness of 7-10ths of an inch; columnæ much thickened; mitral valves natural; measure four and a half inches along their attachment; the semilunar valves of aorta are stained with blood; each presents a rent near and parallel to the loose edge; these rents extend nearly to the point of attachment to the aorta.

Aorta healthy; when cut open measures three and 3-10th inches; the large vessels generally contain *very* little blood; the colour and consistence of the little which is found is natural.

Head and *spine* not examined.

THE MEDICAL EXAMINER.

PHILADELPHIA, MARCH 20, 1841.

EPIDEMICS OF THE SEASON.

For some weeks the past the prevailing epidemic at Philadelphia has been influenza; as is usually the case, the chief sufferers are children and aged persons, especially the former. In many of them the disease appears as a simple bronchitis, without offering very peculiar symptoms; but in other cases it is extremely severe, and is attended with pneumonia in various degrees of intensity. The pneumonia is in general of the lobular kind, and either succeeds a bronchitis of severe duration, or it occurs more insidiously, as a slow congestion, which does not at first produce much irritation of the air-cells. In some cases the internal congestion is so severe, that reaction establishes itself slowly, and even with difficulty.

The treatment of the disease is not in general very difficult; we have found it necessary to take blood in the smaller proportion of cases, and have relied mainly on mild, *protracted* revulsion, and on ipecacuanha, given so as to

cause some nausea, either in the form of wine or syrup. In the more inflammatory cases, when bloodletting was advisable, we have substituted small portions of calomel and antimony for the ipecacuanha. In the declining stages of the affection, when the secretion has become abundant, the lac assafœtidæ, with the addition of a little syrup of senega, is most beneficial.

In the use of revulsives in the inflammations of the chest, especially as they occur in children, it has appeared to us that a mistaken notion is very prevalent, and that the disease is treated by too powerful remedies, which confine their action to a small surface, and irritate the nerves more than they unload the congested vessels. We are much more favourably disposed to milder, but more extended revulsives, which may be applied to a large surface, and allowed to remain in contact with the skin for a long period. These remedies are stimulating foot-baths, repeated several times daily, and poultices to the feet and ankles, made with thick slices of bread moistened with hot vinegar, and dusted with mustard. Over the chest a poultice of onions, made either with simple water, or vinegar and water, acts extremely well.

These are common, every day remedies, but they are just what are wanted, and certainly produce a better and generally a more decided impression upon the disease, than highly stimulating applications, which are in general unsuited to children. What is perhaps still more important is, that in this disease as in many others, the natural tendency is decidedly to a cure; and the nice adaptation of very simple remedies will favour this result, while the less accurate administration of more powerful ones will be almost sure to disturb the natural progress of the disorder.

Another peculiarity has attended this epidemic: some cases of typhus have occurred in the Blockley hospital, and one or two have been admitted there from the city. Those which occurred in the hospital, with a single exception, or at most two, came from one part of the house where the inmates were in constant communication together, but were in a great degree, secluded from the rest of the building; an assistant nurse in the same department also fell ill of the disorder. The disease is in general of a mild type, and offers but little difficulty as to the treatment. It is the proper petechial typhus, attended with the characteristic eruption, and not the typhoid fever. The whole number of cases is fourteen or fifteen, according to the admission or rejection of one case which was admitted very late in the disorder. They are all either doing well or recovered, with a single exception. This patient laboured under phthisis, and was attacked with the fever, which passed through its stages regularly,and after its termination the patient sank in part from his original disease, and in part from the feebleness induced by the attack of fever. As the disorder is of that moderate type which tends naturally to a cure, our treatment has been either laxatives of oil for several days, and the abstinence from any pharmaceutic remedies, or the spirit of mindererus, and other mild diaphoretics. Sinapisms to the extremities, and cold applications to the head, were occasionally prescribed, but the local symptoms were so mild that it was scarcely necessary to resort to local blood-letting in a single case.

The only point of treatment requiring much attention is the necessity of stimulation in most cases towards the close of the disease, and in some at earlier periods. The action of the heart and arteries was feeble, and of course afforded a very certain guide as to the propriety of giving stimulants; when the feebleness occurred late in the disorder, it generally accompanied the decline of the febrile excitement, and sometimes occurred very suddenly. The prostration requires more attention than any other symptom connected with the present epidemic; and when patients fall into it, the only safeguard is the use of wine and other excitants of a similar kind.

Every reader of medical literature must be struck with the infrequency of unsuccessful cases recorded. Of late years, indeed since the increased cultivation of pathology, we we have derived much valuable statistical matter from the *medical* wards of many of our hospitals, where the cases presented have been faithfully noted and communicated without selection or suppression. That there is, however, a general ndisposition to the publication of cases terminating unsuccessfully, will be evident to

any one who will turn over the pages of a series of medical periodicals. Even of the Alms House Reports, and Hospital cases, the greater portion are palpably served up to illustrate the successful issue of a favourite remedy or mode of treatment; while of cases selected from private practice, does any reader remember as many as he can count on his fingers where diagnosis is represented as faulty or the therapeutics inefficacious? How many surgeons, too, report the operations in which they have failed? In fact, do not the pages of our journals shine forth a brilliant record of triumphant art, very different from the real results of our bed-side experience? It may be thought injudicious to hazard these remarks; they may be liable to misconstruction or perversion, but we think the true interests of science will be advanced by proclaiming the truth and calling attention to the fault. It has not been our practice nor is it our present aim to assume a censorious tone. But as members of a common profession, with the same interests, and certainly no exemption from the same failings as those we address, we claim the right to comment on what strikes us as a prevailing tendency to a pernicious error. In our editorial career, we have seen suppressed the history of more than one most interesting epidemic, carefully prepared for publication, because of the mortality that accompanied it; we have had more than one promise of the record of an operation, *provided* it should be successful—we have time and again seen most honorable and distinguished men, having really at heart the advancement of their profession, and assured of their own position, shrink from the publication of fatal cases, though fatal in defiance of whatever skill and attention could effect.

It is unnecessary to attempt at length the illustration of the point we wish to urge. It is a point generally conceded *if* not as generally acted upon. We dwell upon it without pretension to advance any thing not generally felt, but from a belief that the mere stirring up of the subject will be advantageous. We of course mean no personal allusion.

We have been requested by Dr. Warrington to insert the following correction to his paper on the Cæsarian section, published in our last number. With this we cheerfully comply, as an act of simple justice to the distinguished Professor in whose hands the operations alluded to were followed by such complete success. The cases were reported by Drs. Nancrede and Fox, and the author inadvertently referred to them as *their* cases. The operations were performed by Dr. Gibson.

Erratum.—In last line of the first paragraph of the second column of page 167 of the last number of the Examiner, instead of the word "of," read *reported by*, before the words Nancrede and Fox.

The Cæsarean section was performed on Mrs. R——, the subject of the reports alluded to, by Professor Gibson, of the University of Pennsylvania.

DOMESTIC.

We learn from a late number of the Bulletin of the Academy, that Tessier, the celebrated writer on agriculture and the diseases of grain, is dead at the advanced age of nearly a century. He was a member of the Royal Academy of Medicine; and his eulogium, as is usual in such cases, was read by the perpetual secretary, M. Pariset.

As the subject of diseases of plants and of animals is one which is more or less closely connected with medicine, either from the analogy which exists in the disorders of different classes of living beings, or from the diseases of the human race to which unwholesome food gives rise, we insert from the Farmer's Cabinet an interesting article on the rust of wheat, one of the most important diseases to which that plant is liable. It is written by a scientific gentleman of this city, who has devoted great attention to the study of agriculture. The analogy between this disease of wheat and the mode in which many disorders attack the human frame, is very apparent: and the physiological relations between plants and animals are probably not more closely connected than their diseased states. In the present instance the researches of the author of this essay on the rust of wheat led him to the study of the source of animal heat; and he has strong reason to believe the correct theory is that which ascribes the formation of heat to the conversion of the fluid blood into the solids of the body. The objections which have been urged against this theory are much less forcible when the analogy between plants and animals is kept in view; and we may, on a future occasion, be able to furnish some interesting developments upon this sub-

ject, which place many facts relative to it in a new point of view.

Mildew, or meldew.—After reading an essay in the last number of the Cabinet headed "Blight on Wheat," I was induced to read what numerous authors had written on the subject of mildew, rust, and blight; but on reflection, in regard to the *terms*, it was thought best to expunge the latter, as too general and indefinite to be applied to a specific form of disease, the character of which is well known to farmers, though the *cause* is not well understood. We say, familiarly, that any species of grain, fruit, &c., that fails in arriving at perfection, is *blighted*, without any reference to the form, character, or cause of the disease or accident, which has given rise to the failure.

The term *mildew*, or *meldew*, which I suspect was the original word, is formed of the word *mel*, which means honey, and *dew*, which needs no explanation; the combined term being, in plain English, *honeydew*, which, no doubt, took its designation from a sweet substance found on the surface of the wheat after it became diseased, and which is now believed to be the excrement of very small insects, which attack the plant after the hand of death has come upon it, and decomposition has commenced. The term *rust* needs no explanation to the farmer who has once suffered by this form of disease in his grain crop. These two terms indicate forms of disease, both of which, it is believed, proceed from one common cause, and are only slight modifications of the same disastrous malady.

Some of the authors which have been examined, ascribe the disease to great heat, some to hoar frost or cold after great heat, electricity, diseased seed, disease of the root of the plants, the presence of the barbarry bush, fungi, insects, wind from particular quarters, and various other causes, all equally unsatisfactory.

It is pleasant and satisfactory to be able to trace the diseases, both of animals and vegetables, to their true cause, even if we should not be enabled to prescribe a remedy for them; and upon reflection in regard to the various circumstances connected with the mildew in grain-crops, some thoughts have arisen and have matured into opinions, which I will throw into the common stock, that farmers may judge of them, and see how far they agree with their own experience and observation.

The conditions under which it is believed that wheat arrives at the greatest perfection are, a cool season and a reasonably dry atmosphere at the time of the filling and maturation of the grain; it being assumed that the soil is sufficiently moist to furnish the requisite nutriment for a healthy state of the plants.

The summer of 1816 was of this description, and the wheat of that year was of extraordinary weight and fineness; and what was then considered of equal importance, the crop, when brought to market, sold for three dollars per bushel of 60 lbs., a price it has never since commanded. A worthy farmer, residing in Montgomery county, had that season an average of 32 bushels and 8 lbs. per acre for his whole crop, and sold it for 3 dollars per bushel, being a little more than 96 dollars per acre, and the farm on which it grew cost him 24 dollars per acre some twenty years previous.

The circumstances, which are supposed to be always present in a greater or less degree when the crop becomes diseased with *mildew*, are the following, viz.: The atmosphere saturated with moisture, in the form of fog or otherwise, a high temperature of the air, and scarcely a breath of wind stirring, the latter being a necessary consequence of the former conditions, because, if the wind was active, the moisture would be dissipated and the heat rendered less sensible. In fact, such weather as is familiarly known by the term hot and muggy, and which sometimes relaxes the human system to that degree that it seems as if it was on the point of dissolving; the reason being, that the air is so saturated with moisture that it refuses to take up the insensible perspiration from the surface of the human body, and the heat, which would necessarily go along with it, remains pent up within us, without a possibility of escape, to our great suffering and discomfort.

There are other conditions of the crop, which render the above circumstances more certainly fatal; but it is doubted whether *alone* they would be much detrimental in producing mildew, such as a very succulent, vigorous growth, produced by manuring too highly, &c.

Now for the *theory;* the word I don't like much, because farmers in general complain so much about theories; but have them we must, while men continue to *think;* for if we think about facts, we are constantly forming theories, in spite of our wishes to the contrary; but theories are only bad or wrong when they don't explain facts, and of this every man must judge for himself. If theories are true, and give sound reasons for things, they are good theories; if not, they are bad, and should be discarded without ceremony.

All plants derive their nutriment from the earth, and take it up in a state of very dilute solution in water; this is elaborated in their organs, in a way incomprehensible to us, and deposited where it is needed, to promote the growth and expansion of the plant, and enable it to perform the functions designed in its creation; and the great object would seem to be, to cause it to perfect its seed, and continue its species. When this deposit of nutriment is made, the water, which was its vehicle of conveyance, is thrown out of the plant as excrementitious by proper exhaling vessels, and is dispersed, in the form of vapour, in the atmosphere, and the vessels of circulation, which are in continual action, introduce continued

supplies of similar nutriment duly prepared for deposit, and throw off the water as before, so that there is never a vacuum in the plant.

This process is in continual action till the plant is perfected, and the quantity of water thrown off during the progress of vegetation is almost incredible, as would appear by some very accurate experiments made to indicate the amount. Of 15 parts of water taken up by some plants, 13 are transpired, and of the lowest on the scale, of 5 parts taken up 4 are discharged by exhaling vessels.

Wheat and other plants, when they have acquired their full growth, commence the interesting business of perfecting their seeds, in order to perpetuate their kind; and then nature brings all her powers into requisition to effect this remarkable process. The vessels of the plant are distended with the proper fluid making its way to the seed-vessel, which has been duly prepared to receive it, which is there deposited in the form a milky juice, when the water, which has been the vehicle for its conveyance, is discharged through exhaling vessels into the atmosphere, and another supply from the same source is constantly in the rear, to be disposed of in a similar manner; and so the process goes on—provided there is no unfortunate interruption from external causes—till each grain is filled with farina, when, the great work being completed, the circulation ceases to be carried on, and the whole is dried and hardened for preservation.

When this process is going forward, it will be perceived that a vast proportional quantity of water must be constantly discharged into the atmosphere, otherwise, space would not exist in the hull of the grain for additional supplies of the diluted nutriment, which is continually arriving at its destined depository; but should the atmosphere at this critical period unfortunately be *saturated* or *surcharged* with *moisture*, as has been before hinted, it will be unable to take up and carry away that which the grain must necessarily part with, and which is now an incumbrance to it, in order to make room for an additional supply of the fluid which would increase the deposit of farina. This inability of the air to take up an additional load of moisture under the circumstances of its previous *saturation*, prevents it also from carrying off the heat from the wheat, so that the temperature of the whole plant is increased much above the proper standard of its healthy action; for the temperature of plants that transpire moisture freely is constantly kept many degrees cooler than the surrounding atmosphere, or bodies destitute of vital action. This retention of excrementitious moisture suspends the circulation, for it can't move unless it can get vent, and that and the expansion occasioned by increase of temperature produce congestion, and burst the vessels of circulation, and discharge their contents into the cellular texture, destroy the vitality of the plant, and leave the hull only partially filled with farina. Heat, air and moisture, the agents of putrefaction, being present, decomposition begins, and the surface of the plant soon displays signs of decay. This destructive process first shows itself in the smallest part of the stalk, near the head, which is of most recent formation, and consequeutly most succulent and tender, and most liable to rupture. The rust is probably occasioned by the heat and internal pressure enlarging the pores of exhalation and discharging the sap on to the surface of the stalk, and when evaporation carries off the moistnre, the residuum displays itself somewhat like the rust of iron. After the rupture and discharge of the sap vessels, the surface of the plant is covered with mucus which is adhesive, and this will account for the seeds of fungi, which are supposed to be floating in abundance in the atmosphere, taking root and vegetating in the decaying structure; and hence the supposition, that fungi are the *cause of mildew*.

The presence of animalcula may be accounted for on the same principle, for nature is ever economical, and wherever animal or vegetable substances are in the progress of decay, mouths are found ever ready to convert dead matter into food for living things, so as to perpetuate the largest possible amount of animated existence. On the death of the plant, the tender succulent fibres of the roots immediately decay, and on drawing them from the ground, the appearance of them has led many to suppose that they had thus discovered the true *cause* of the disease of the plant, when, in fact, it was only the *effect* of its previous dissolution.

It may be objected, that if the mildew is the result of a general saturation of the atmosphere with moisture at a particular period, that all wheat should be equally injured by it; when the fact is well known, that of contiguous fields one will be destroyed and the other remain uninjured. This apparent contradiction is accounted for by the uninjured wheat being more forward in filling than the other, for the whole mischief takes place in a few days, perhaps a few hours; and where the grain has received the requisite supply of nutriment the circulation is diminished or suspended, and there is no danger of injury from the canals breaking their banks and overflowing.

The grain in the same inclosure is often partially injured; in low and damp spots, or where it is lodged, for want of the requisite circulation of the air to dissipate the moisture, the injury is great from mildew; when in the higher and drier parts parts of the same field, it is protected from injury, by a freer circulation preventing the mischief by carrying off the excess of moisture and promoting a healthy transpiration from the plants.

The elasticity of plants favours their being put in motion by the wind, and this no doubt increases the circulation of the sap, in the same way that motion in animals promotes the circu-

lation of the blood; and, at the same time, it favours the evaporation of moisture and promotes a healthy condition. On this principle, it is supposed that good may arise from passing a rope extended across the ridges of wheat in in such a manner as to communicate motion to the stalks, and in some measure dissipate the excess of moisture on the principle of *fanning*, as has been recommended by some writers on the subject of mildew. But perhaps the most effectual plan of guarding against this fatal disease would be to seek for and sow only the earliest varieties of wheat, which fill before the season arrives most likely to be accompanied by that condition which is the cause of the injury.

AGRICOLA.

HEALTH OF THE CITY.

INTERMENTS *in the City and Liberties of Philadelphia, from the 6th to the 13th of March*, 1841.

Diseases.	Adults.	Children.
Asthma,	2	0
Abscess of lungs,	0	1
——— kidneys,	1	0
——— thigh,	1	0
Apoplexy,	1	0
Burn,	0	1
Cancer,	1	1
Caries of spine,	0	1
Croup,	0	2
Cong'n of lungs	0	4
Consumption of the lungs,	14	8
Convulsions,	0	7
Dropsy,	3	0
—— abdominal,	1	0
—— head,	0	6
Dis'se of the brain,	0	1
—— heart,	0	1
—— stomach and bowels,	1	0
Debility,	0	1
Erysipelas,	0	1
Fever, typhus,	2	0
—— typhoid,	1	0
Hooping-cough,	0	1
Hernia strangul'd	1	0
Influenza,	1	0
Inflammation of the brain,	0	3
—— bronchi,	0	6
—— lungs,	6	4
—— stomach and bowels,	1	1
—— liver,	1	0
—— peritonæum,	1	1
Carried forward,	39	51

Diseases.	Adults.	Children.
Brought forward,	39	51
Intemperance and exposure,	1	0
Inanition,	0	1
Marasmus,	0	1
Measles,	0	4
Mania a Potu,	1	0
Old age,	1	0
Palsy,	2	0
Pleurisy,	1	0
Scrofula,	0	2
Small pox,	3	5
Still-born,	0	5
Suicide,	1	0
Tetanus,	0	1
Unknown,	1	0
Worms,	0	1
Total,	121—50	71

Of the above, there were under 1 year	31
From 1 to 2	16
2 to 5	8
5 to 10	9
10 to 15	3
15 to 20	6
20 to 30	12
30 to 40	7
40 to 50	9
50 to 60	7
60 to 70	8
70 to 80	5
80 to 90	0
90 to 100	0
Total,	121

In the above are included 21 people of colour, and 4 interments from the alms-house.

FOREIGN.

We published in a former number of the Examiner the statistical tables of Drs. Norris and Hayward, exhibiting the results of Great Amputations, during a series of years in the Pennsylvania Hospital, and in the Massachusetts General Hospital. From these, many learned with surprise, that even under circumstances so favourable to success, the average mortality was a fraction more than 1 in 4. We are glad to perceive that these statements have received a degree of attention abroad, commensurate with their importance, and have elicited additional facts, which all confirm the position of Drs. Norris and Hayward, that the dangers of large amputations have hitherto been grossly underrated. We expressed at the time our regret, that these tables were so limited in their object. They were intended to display merely the average mortality; they clearly exhibited the dangers of large amputations, while they offered no indication by which these dangers could be lessened or avoided.

In the admirable paper by Dr. Lawrie, which we quote below, we are glad to see that the author coincides with our views of the necessity of rendering such statistics more comprehensive, if we wish to give them their full practical value. The additional facts deducible from his tables, prove him to be right. Thus a comparison of the proportionate number of deaths after amputation of the leg, in reference to the points where the bones were sawed, has already served to confirm the opinion we entertained, that amputations near the ankle were less dangerous than those higher up, and consequently that the very general practice of operating immediately below the knee, should be abandoned when there is a choice, and as much of the leg be preserved as possible.

But by far the most important addition to the statistics hitherto published, is to be found in the last table of Dr. Lawrie, which shows "*the causes of death* in 73 amputations, the limbs amputated, and the number of days each case survived."

Cases of amputation are so numerous, and can be so rigidly classified, that the results of their analysis may be regarded as more exact than could be derived from any other source. The causes productive of death are not to any great degree peculiar to amputations, but

are common to them and other great surgical operations. The present spirit of inquiry in regard to this class is therefore calculated, if properly directed, to throw the clearest light upon the dangers of operations in general, and possibly to open a road for their future avoidance. It is with this belief that we lay before our readers the paper of Dr. Lawrie.

On the Results of Amputations. By J. A. Lawrie, M. D.

The frequency of its performance, the mutilation which it causes, its severity, and its immediate and ultimate dangers, combine in making the operation of amputation one of the most important subjects which can occupy the attention of the practical and operative surgeon: it is peculiarly so to the hospital surgeon in such a city as Glasgow. In private practice, in the better ranks of society, it is an operation of comparatively rare performance; whereas in hospitals it exceeds many fold all the other capital operations combined. In this city and neighbourhood, the character of the climate strongly predisposing to diseases of the joints; the number of our public works; the extent and variety of machinery employed in our manufactories; the amount of our shipping, and number of steam vessels; our coal mines and stone quarries; the great increase of building, and the certainty that ere long Glasgow will be the centre from which numerous rail-ways will radiate, give to the operation of amputation, by greatly increasing its frequency, an interest exceeding perhaps all others performed in our infirmary.

I need not inform the members of this section that this subject has attracted much attention, and that of late years many parts of it have been so much improved as to leave little farther to be desired. The subject of this essay, "The Results of Amputations," has not, however, met with that consideration to which its importance appears to entitle it. Although success may not in every instance be a fair test of the propriety of treatment adopted in individual cases; in the aggregate, it is the best—indeed, the only true—criterion by which to judge of operative surgery. For many years the operation of lithotomy, and the removal of cancerous disease have been tested in this manner, and the result has been that the confidence of the profession has increased in the one, while the other, except as a palliative, has been almost entirely abandoned. I am surprised that the same severity of investigation has not been applied to amputations. Mr. Samuel Cooper, in the last edition of his Dictionary, while he devotes several columns of his closely printed pages to the history of amputations, says scarcely a word of their results.

Our best and most recent works on operative surgery are open to the same objection; for while the different methods which ingenuity has suggested for the removal of particular parts are minutely detailed, hardly one word is said of the results of their operations, either in the aggregate, or as contrasted with each other. Our military surgeons for many years have been more attentive to this subject than their brethren in civil practice; but until the end of the peninsular war their opinions were by no means in accordance regarding it. Belguer, Surgeon-General to the Prussian army, in a treatise published in 1762, condemns amputation as an operation hardly justifiable under any circumstances. He carried his opposition so far, that "he suffered no amputation to be performed in the Prussian army." He states his success as follows;—I had at one time during the war, in a military hospital, 6618 wounded patients; of them 5557 were perfectly cured, 195 were able to do duty in person or to work at any trade, 213 remained incapable of any labour, civil or military, and 663 died. The 195 and 213 invalids were of the number of those who had their bones broken and shattered, or, in other words, whose wounds were complicated and dangerous. Of the 663 who died, 408 only, died from shattered bones, which number, 408, is equal to that of those who were cured without amputation, although their wounds had been of the same kind." One half therefore of his severe wounds of the extremities died, the other lived without operation. "If," continues Belguer, "after making these calculations, we compare them with the prodigious number of married men who, at the beginning of the war, had their limbs taken off on account of dangerous wounds, of whom scarcely one or two escaped with their lives, we may safely conclude that much the greater part of these 408 men cured and sent to the invalids, would have died if amputation had been performed."

The result of Belguer's experience would thus seem to be, that of 6618 wounded, 916 were cases requiring amputation, of whom 408 died, 213 were incapable of any labour, and 195 were able to work at any trade.

These opinions do not seem to have influenced the practice of British military surgeons, who never seem to have doubted the propriety of amputations in certain severe accidents. With them the preference to be given to primary or secondary amputations after gun-shot injuries, formed the principal ground for difference of opinion. Wiseman and Manby were in favour of immediate amputation, while John Hunter was an advocate for the secondary. Towards the close of the peninsular war, British military surgeons were almost unanimously in favour of the former. Mr. Guthrie, in his work on Gun-shot Wounds and Amputations, gives the following tables:—

I. *Amputations performed at hospital stations.—Secondary.*

	No. of Amputations.	*Died.*	*Discharged Cured.*	*Under Treatment.*
Amputations of upper extremity -	296	116	105	75
Amputations of lower extremity -	255	149	65	41
Total,	551	265	170	116

II. *Operations performed on the field of battle.—Primary.*

	Number of Cases.	*Died.*	*Discharged Cured.*	*Under Treatment.*
Amputations of upper extremity -	163	5	64	94
Amputations of lower extremity -	128	19	43	66
Total,	291	24	107	160

From these tables it appears that of 551 cases of secondary amputations, 265, or nearly one half, died. Of 291 cases of primary amputations, 24, or nearly one in twelve, died. Farther, the comparative loss in secondary or delayed operations, and primary or immediate, is—

	Secondary.		*Primary.*
Upper extremities - - - -	12	to	1
Lower extremities - - - -	3	to	1

These tables appear quite conclusive as to the propriety of primary amputation in military practice. In other respects, however, they are not so satisfactory as could be wished. The cases marked "under treatment," in both tables, having passed the periods of danger, are considered as recovered. In civil hospital practice, I would not consider a patient recovered until he had left the hospital; and as the cases under treatment amount to 276, they cannot be looked upon as accurate data for estimating the results of amputations.

In the *Medical Gazette* for June 1838, there is a paper by Mr. Phillips, entitled "Observations arising out of the Results of Amputations in different Countries." He says (p. 459,) the amputations included in this inquiry are those of the arm and forearm, leg and thigh. The whole of them have been performed in the last four years in civil hospitals, and in the private practice of hospital surgeons. The details are—

	Cases.	*Deaths.*	*Per Cent.*
France - - - - - -	203	47	$23\frac{31}{203}$
Germany - - - - -	109	26	$23\frac{93}{109}$
America - - - - -	95	24	$25\frac{5}{19}$
Great Britain - -	233	53	$22\frac{174}{233}$
Total	640	150	$23\frac{1}{7}$

By these returns it appears, that the average number of deaths is nearly 23½ per cent. The remainder of Mr. Phillips's paper is devoted to the question of immediate or secondary union of stumps after amputation for disease, the result of which is, that "attendant on the practice of immediate union is a mortality amounting to 25 per cent."

It must be obvious that the experience of any one of even our best employed surgeons must be inadequate to determine a question of such extent as the results of amputations. Experience on a large scale, and extended over a considerable period can alone be relied on. It occurred to me, that the records of an infirmary, carefully examined, might in a great measure supply the deficiency, and that details more minute than any I have yet met with, might be of use to our hospital surgeons. Assisted by my young friends, Dr. M'Lean and Mr. Parish, I have carefully examined all our infirmary surgical records which I could procure, from the commencement of the hospital to the beginning of 1839, and I have now the pleasure to lay the results before this section. They are neither so extensive, nor, in many instances, so minute as I could wish. Many of the journals have been lost, and others are very carelessly kept; some, on the other hand, are so admirably accurate, that had all the surgical and medical records of any infirmary, from the year 1795 to the present day, been as carefully kept, they would have presented a mass of information capable of determining almost any point in the professional statistics of hospital practice. We are not yet too late, and I would take the liberty of impressing on the members of this section, connected with hospitals, the great value of accurate records. The present state and history of every case ought to be entered in a journal kept for the purpose, and belonging to the hospital, which ought to be premised by a statement of the patient's name,

age, constitution, occupation, and residence. (This last is of importance, as enabling us to trace our patients after they leave the hospital, and to ascertain the ultimate result of our treatment.) The date of each operation should be accurately noted, and the true results candidly given. It would also be a convenience if the indices were properly filled up with a column for "operations."

The abstract from which these remarks and tables are drawn consists of 276 cases of amputation of the shoulder, arm and forearm, hip, thigh, leg, and foot, as they occur in the journals, from 1794 to the end of 1838.

Of these 276 there were—

Cured	176	63.7	per cent.
Died	100	36.3	"

Deaths to recoveries as 1 to 2.75

a mortality, I fear, greater than those are prepared for, who have not been in the habit of turning their attention to this subject.

Of the 276 there were—

		Cured.	*Died.*	*Deaths to Recoveries.*
Males	216	130	86	1 to 1.6
Females	60	46	14	1 to 3.3

By which it appears that the males are to the females as 3½ to 1, and that the proportionate mortality among the males is to that among the females as 1.6 to 3.3. The greater mortality among the males is in part, but not altogether, accounted for by the greater number of primary amputations among them, as will appear in the sequel.

Of 133 cases in which "the number of days in hospital after amputation" is noted, 79 were cured, 54 died. Of the cured, the average number of days under treatment after operation is 42, the least being 8, the greatest 128. Of the deaths, the average is 13 days, the least three hours, the greatest 199 days.

I have divided the cases of amputation into two general classes: 1. Amputation for disease: 2. Amputations for injuries. The second I have subdivided into primary and secondary. By primary amputations, I mean amputations for injuries performed as soon after the accident as circumstances will permit —almost always within the first 24 hours, and without any attempt made to save the limb. By secondary, those cases in which attempts have been made, and failed, to preserve the limb, and amputation been performed in consequence of the failure. Each of them I have subdivided into amputations at the shoulder, arm and forearm, hip, thigh, and leg.

I. *Amputations for disease.*—Of the 276 cases, 153 (more than one-half) were for disease.

Cured	118	77.1	per cent.
Died	35	22.9	"

The following table shows the detailed results:—

	No. of each.	*Cured.*	*Died.*	*Deaths to recoveries as*
Shoulder - -	2	1	1	1 to 1
Arm - - - -	17	14	3	1½ to 7
Foream - - -	4	4	0	No death.
Thigh - - -	92	73	19	1 to 3¾ nearly
Leg - - - -	35	23	12	1 to 2 fully
Foot (partial)	3	3	0	No death.
Total	153	118	35	

The diseases with their results were as follows:—

	Of which there were	Males		Females		Total Cured.	Total Died.	Deaths to Recoveries.
		Cured.	Died.	Cured.	Died.			
Diseased joints - 98		60	11	23	4	83	15	1 to 6 1-5th
Necrosis - - - - - 12		7	1	2	2	9	3	1 to 3
Caries - - - - - - 21		13	4	3	1	16	5	1 to 3 1-5th
Tumors - - - - - 12		6	2	3	1	9	3	1 to 3
Gangrene - - - - - 5		1	1	2	1	3	2	2 to 3
Ulcers - - - - - - 5		1	4	0	0	1	4	4 to 1

In this table of the more common amputations, that below the knee is the least favourable. This may be owing to the unfavouarble situation at which the operation is performed. In a great majority of instances, even for disease of the foot and ankle, amputation of the leg is performed below the knee, to enable the patient to rest on the bent knee, in using the common "wooden pin." But by a very simple, and by no means expensive apparatus, the patient can walk on the "wooden pin" with his knee straight, and a long stump, instead of being an inconvenience, is a great advantage.

The above tables, by pointing out the danger of the common method of operating, should induce us never to remove more of the limb than will insure that the parts which form the stump are sound, and in all cases except those of necessity, to abandon the operation "below the knee."

It struck me as remarkable, that of the first 30 amputations in the list "for disease," viz., from the year 1794 to 1810 inclusive, 29 recovered, and one died; whereas, of the last 30, 22 recovered, and 8 died. Thinking this might be accidental, I took the central numbers

(from 142 to 209, inclusive,) and the proportion was 19 cures, and 11 deaths. It is not altogether easy to account for this very remarkable discrepancy. It is obviously by no means complimentary to our modern improvements in operating and dressing. Of the first 30, in which the cures are to the deaths as 29 to 1, it is probable that all the operations were performed by the double circular method, that all the stumps were dressed before the patient left the table, that the dressings were removed by rule, with little regard to the appearance of the stump, and that in all the tourniquet was used. Of the last 30, of which 22 recovered, and 8 died, 28 were single or double flap operations, of which 21 recovered, and 7 died; 2 were double circular, of which one was cured and one died.

Of the *supposed* recent improvements, there is one which I may be excused for noticing in this place,—I mean delayed dressing. This after what I thought a fair trial, I have almost entirely abandoned. Its advocates support it mainly on the plea of avoiding secondary hæmorrhage. In my own practice I do not recollect ever to have taken down a stump for this cause, and I believe a little care in tying bleeding vessels on the operating table would prevent it. My objection to the plan of not dressing the stump till six or eight hours after the operation, is the additional suffering that it causes our patients. I have uniformly found my patients complain fully more, and suffer nearly as great a shock from the delayed dressing as from the operation itself. As for preventing hæmorrhage, the support of the dressings frequently has this effect; and as for the pain of removing the dressings in the few cases in which hæmorrhage does occur, I believe it to be small in amount in comparison with that which must be occasioned in every case by not dressing on the table.

It is probable that, previously to the publication of Sir B. Brodie's work on Diseases of the Joints, diseased articulations, especially of the knee, classified under the comprehensive appellation "white swelling," were reckoned incurable, and removed at a much earlier period than they now are. Of this I am convinced from a perusal of the cases, as recorded in the journals of the Infirmary. Amputation seems to have been performed for disease, the very proposal of removing which by operation a modern consultation would scout. To prove this I constructed the two following tables. I took the 71 first cases of diseased joints as they occur in the journals, from 1794, downwards, and 82 in the journals since 1833, without selection. The numbers 71 and 82 are accidental.

Tables showing the results of diseased joints, treated in the earlier and later periods of the hospitals

	Amputated.		*Not Amputated.*			No of Cases.
Early period.	Cured.	Died.	Cured.	Relieved.	Died.	
Elbow - - -	5	0	1	6	0	12
Wrist - - - -	1	0	1	2	0	4
Knee - - - -	16	3	9	15	1	44
Ankle - - - -	5	0	2	4	0	11
Totals	27	3	13	27	1	71
	30		41			
Late period.						
Elbow - - -	3	0	2	6	0	11
Wrist - - - -	2	0	3	0	0	5
Knee - - - -	8	3	24	20	2	57
Ankle - - -	4	2	2	1	0	9
Totals	17	5	31	27	2	82
	22		41			

From these tables it appears, of 71 cases of diseased joints in the early days of the hospital, 30, or 1 in 2.36, suffered amputations; while of 82 in the later period, 22, or 1 in 3.73, only were operated on. The difference is still more striking if we take the knee joint. Of 44 in the early period, 19, or 1 in 2.30, were amputated; while, at the later period, of 57, 11, or 1 in 5.1, were removed, and I believe the differences are daily increasing. Of the whole number amputated in the early period, 1 in 9 died; in the later, 1 in 3 2-5ths. Cured, including amputations, in the early period, 40, or 1 in $1\frac{3}{4}$; in the later 48, or 1 in $1\frac{5}{7}$ very nearly. Cured without amputation in the early period, 13, or 1 in 5.4; later period, 31, or 1 in 2.6. From which it appears that the number of cures in the two periods is nearly precisely the same, but that in the early period it is effected principally by the amputating knife, in the later by treatment.

Another practical conclusion appears to be, that in disease requiring amputation, after the acute stage has passed, the earlier the amputa-

tion is performed the better is the chance of recovery. This is a conclusion at which I have long since arrived, and I would lay it down as an axiom, that the shorter the duration of the disease, and the less the system has suffered under it, the greater is the chance of recovery after amputation, and *vice versa*. The difficulty is to determine, in the early stage, what disease is curable without amputation, and what must ultimately be removed; a correct diagnosis here, as in almost every other instance, being essential to success. The error we at present commit is delaying amputation after every other rational hope of cure has fled, merely because the patient is not obviously dying. The consequence has been the reduction of the success of amputations from 1 in 30 to 1 in less than three by one calculation, and from 1 in 9 to 1 in 3 2-5ths by another. To this point I would beg to call the attention of hospital surgeons in this section. Our predecessors amputated to remove what they reckoned an incurable disease, while the health was still good—we seldom operate except to save life, or rather to preserve from immediate death. Now I feel satisfied, that the number of lives rapidly ebbing from whatever cause, which amputation will save, is very small; and if we restrict our amputations to such cases, we must necessarily be very unsuccessful. I am no advocate for uncalled-for operation; but surely it is better to save life by removing a disease which we cannot cure, than to delay until treatment and amputation are nearly alike unavailing. A medium between the early and modern practice of our hospitals would preserve limbs and save lives. It is, however, but justice to ourselves to state, that the more dissipated habits and lowered condition of our patients, added to the increased size of our hospital, and the crowded state of its wards, must have considerable influence in diminishing the success of our operations.

Primary amputations.—Of the 276 cases, 77, or 1 in 3-5, are primary. Of these 38 were cured, 39 died, the recoveries and death being very near equal.

The following table shows the results in each limb:

	No. of each.	*Cured.*	*Died.*	*Deaths to recoveries as*
Shoulder joint -	3	1	1	2 to 1
Arm - - - -	23	12	11	11 to 12
Forearm - - -	15	15	0	No death.
Hip - - - -	1	1	0	No death.
Thigh - - -	12	1	11	11 to 1
Leg - - - -	22	7	15	2 to 1 fully.
Foot (partial) -	2	2	0	No death.
Total	77	38	39	

The remarkable circumstance in these results is the great mortality. As it stands the deaths exceed the recoveries; and if we exclude the forearm, all of which recovered, the disproportion becomes very great. When we compare this table with that of Mr. Guthrie, the discrepancy is extraordinary. In his primary operations the deaths are to the recoveries as 1 to 12; in ours they rather exceed the recoveries. I believe that in military practice, especially on the field of battle, very many limbs were removed which, in civil practice, we should have attempted to preserve. In our hospital we rarely, if ever, amputate, unless it be obvious that the limb cannot possibly be saved. It is farther probable, that when the patient is seen almost immediately after being wounded, and the amputation is performed on the field of battle, he is in a much better state to bear the operation, and more favourably circumstanced for recovery, than in civil practice, where he is not seen by the hospital surgeon for many hours after the accident, and after being carried, it may be, several miles. Our accidents demanding amputation are rarely uncomplicated; a fall from a height, or the descent of a mass of earth, not only smashes a limb, but injures another limb, the head or other important organ, and inflicts a severe shock on the general system. From these causes the majority of our patients are in such a state of extreme exhaustation and shock when admitted, as to be unable to bear the operation; and when they rally the reaction is too often typhoid, or attacks a vital organ. Our machinery and railway accidents, which form a considerable proportion of our primary amputations, are also very frequently complicated, and of themselves severely implicates the constitution. To these must be added the risks our patients run after the immediate effects of the amputation are past, as explained in the sequel. Whether these considerations satisfactorily account for our great mortality it is not easy to determine.

Mr. Guthrie, in his work so frequently alluded to, insists much on the impropriety of operating while the constitution is much under the influence of shock. In this I fully concur, and I would lay it down as an axiom in primary amputations, that the less there is a shock, or in other words, the nearer the patient is to a state of health, the better will he bear the operation, and the more certain will be his recovery; and I believe it is of the effects of fearful depression that so many of our patients perish.

The second striking peculiarity in our tables is the fatality of our primary amputations of the thigh. In twelve cases there is but one recovery.

Secondary amputations.—Of the 276 cases, 46, or 1 in 6, were secondary. Of these there were—Cured, 20; Died, 26; Deaths to Recoveries as 5 to 4 fully.

The following table shows the detailed results:—

	No. of each.	Cured.	Died.	Deaths to recoveries.
Shoulder-joint .	1	1	0	No death.
Arm	13	6	7	7 to 6.
Forearm . . .	3	3	0	No death.
Thigh . . .	24	8	16	2 to 1.
Leg	5	2	3	3 to 2.
Total	46	20	26	5 to 4 fully.

This table *apparently* confirms the experience of our army surgeons, inasmuch as the *aggregate* result of secondary amputation is even more unfavourable than of primary. It, however, illustrates well the necessity of analyzing tables, because so far from proving that secondary are less favourable than primary amputations, it shows the contrary to be true. In order that inferences drawn from tables of this kind be accurate, the amputations performed *on each limb* must be compared, otherwise they are almost certain to be erroneous. The following table illustrates this:—

Comparison of the results of primary and secondary amputations of each limb.

	Primary deaths to recoveries.	Secondary deaths to recoveries.
Shoulder-joint . .	2 to 1.	No death.
Arm	11 to 12.	7 to 6.
Forearm	No death.	No death.
Thigh	11 to 1.	2 to 1.
Leg	2 to 1 fully.	3 to 2.

This table shows that in the thigh secondary amputations are much more favourable than primary, in the leg decidedly so, in the forearm equal, in the shoulder superior, and in the arm slightly inferior. The numbers in some instances are small, and require confirmation. The *apparently* more favourable results of primary and secondary amputations in the *aggregate* depends on the greater number of amputations of the forearm (fifteen primary, three secondary,) and on two partial amputations of the foot in the former, and none in the latter. It is remarkable that of twenty-two amputations of the forearm recorded in these tables, there is no death. It would be premature to draw from these tables any conclusion for or against primary as compared with secondary amputations. This much I may say, that the encouragement which they hold out for primary amputations in our Infirmary is not great. The subject requires farther illustrations, and I hope will not be lost sight of. To illustrate it still farther, I have noted the results of forty compound fractures and dislocations, in which attempts were made to save the limb, and on which no secondary amputation was performed.

Table showing the results of Compound Fractures and Dislocations (not amputated.)

	No. of each.	Cured.	Died.	Deaths to recoveries.
Thigh - - -	5	1	4	4 to 1
Leg - - - -	21	15	6	2 " 5
Foot and Ankle	5	2	3	3 " 2
Arm - - - -	5	3	2	3 " 2
Elbow - - -	2	1	1	1 " 1
Forearm - -	2	1	1	1 " 1
	40	23	17	

From this table it appears that in attempts to cure compound fractures and dislocations the cures considerably exceed the deaths.—The last table shows that when the attempt fails secondary is more favourable than primary amputation. The combined results seem to warrant attempts to save severe cases, in preference to immediate amputation.

Table showing the number of Amputations performed at different Ages, with the Cures and Death distinguished according to sex, and divided into Amputations for Disease—Primary, Secondary.

Ages from	MALES. Disease. Cured.	Disease. Died.	Primary. Cured.	Primary. Died.	Secondary. Cured.	Secondary. Died.	FEMALES. Diseases. Cured.	Diseases. Died.	Primary. Cured.	Primary. Died.	Secondary. Cured.	Secondary. Died.
1 to 10	9	4	0	0	1	0	2	0	1	0	0	0
10 20	30	2	5	8	3	7	13	3	2	0	2	0
20 30	17	9	10	14	5	0	6	1	2	2	2	0
30 40	15	6	10	4	2	6	7	2	0	0	1	0
40 50	6	4	4	4	1	6	4	1	0	0	0	0
50 60	3	1	1	5	2	3	0	0	0	0	0	2
60 70	1	3	1	0	0	1	2	0	0	0	0	0
70 80	0	0	2	0	0	0	0	0	0	0	0	0
80 90	0	0	0	1	0	0	0	0	0	0	0	0
Totals.	81	29	33	36	14	23	34	7	5	2	5	2
	110		69		37		41		7		7	
	216						55					
	271											

This table contains only 271 cases, because 5 of the 276 of which the former tables are composed had no age given.

The following particulars may be gathered from it:—

Of 216 males 110 were amputations for disease, and 106 (nearly one-half) for accidents. Of 55 females 41 were for disease, and 14 (about a fourth) for accidents.

Of 110 males for disease there were—Cured, 81; Died, 29; Deaths to Recoveries, as 1 to 28.

Of 41 females there were—Cured, 34; Died, 7; Deaths to Recoveries, as 1 to 4.8, exhibiting a proportion decidedly in favour of females.

Of 106 male amputations for accidents there were—Cured, 47; Died, 59; Deaths to Recoveries, as 1 11-47ths to 1.

Of 14 females for accidents there were—Cured, 10; Died, 4; Deaths to Recoveries, as 2 to 5, again giving a result in favour of the females.

Table showing the number of amputations at different ages (including males and females) with the proportionate mortality.

Ages	*Numbers.*	*Cured.*	*Died*	*Deaths to recoveries.*
From 1 to 10	15	11	4	1 to 2 3-4ths.
10 20	48	43	5	1 to 8 3-5ths.
20 30	33	23	10	1 to 2 3-10ths.
30 40	30	22	8	1 to 2 1-4th
40 50	15	10	5	1 to 2
50 60	17	6	11	2 to 1 nearly.
60 70	8	4	4	1 to 1

The rate of mortality for the ages between 9 and 20 is by much the most favourable (1 to 8 and 3-5ths,) while that from 50 to 60 is the least so (2 to 1;) with the exception of those from 60 to 70 (1 to 1,) all the others vary only from 1 to 2 the highest, to 1 to 2 and 3-4ths the lowest.

The ages from 10 to 20 afford the greatest number of amputations for disease; those from 20 to 40 the greatest number for accident.

Causes of death in amputations.—I have been able to procure pretty accurate pathological accounts of 73 deaths after amputation, all occurring in the hospital. I have arranged them as follows:—

Table shewing the causes of death in 73 amputations, the limbs amputated, and the number of days each case survived.

		Primary.	*Secondary.*	*Diseased.*	*Shoulder.*	*Arm.*	*Thigh.*	*Leg.*	*Total.*	*Number of days each case survived.*
Bad sores		0	1	0	0	0	1	0	1	39
Cerebral effusions		0	0	1	0	0	0	1	1	32
Diffuse inflammation and erysipelas		3	1	0	0	3	1	0	4	17, 7, 11, 5
Exhaustion, shock, and complications		5	6	0	0	2	9	0	11	?, ?, 2 hrs., 3,1,12hrs.,1h.
Delirium tremens		0	1	0	0	0	1	0	1	3, 4
Gangrene of stump		4	2	0	0	0	4	2	6	9 hrs., 3, 3, 1, 5, 7
Secondary hæmorrhage		0	2	2	0	0	4	0	4	49, 2, 2, 2
Tetanus		1	0	0	0	0	1	0	1	1
Secondary Inflam. 44. Diarrhœa		2	1	2	0	1	3	1	5	5, 8, 20, 3, 11
Pericarditis		1	0	1	0	1	0	1	2	?, 21
Pleuritis		1	4	1	0	1	4	1	6	?, 94, 4, 6, 12, ?
Pneumonia	29	2	0	0	0	0	1	1	2	20, 38
Purulent deposits		4	5	7	1	5	3	7	16	13, 12, 7, 27, 24, 29, 28, 6
Phlebitis		2	0	1	0	0	1	2	3	14, 5, 17, 18, 18, 5, 10, 36
Rigors		5	1	1	1	3	1	2	7	?, 14, 18, 3, 12, 45, 22
Secondary inflammation		2	0	0	0	0	1	1	2	10, 6
Secondary external abscess		0	0	1	0	0	0	1	1	31
		32	24	17	2	16	35	20	73	

From this table it appears that of 73 deaths, of whose causes and pathology more or less accurate records are given, 32 were primary, 24 secondary, and 17 disease. I have divided the causes of death into, 1st, causes independent of secondary inflammation; and 2d, the various kinds of secondary inflammatory affections.

Of the 8 causes enumerated belonging to the first class, 4 caused one death each, and need not detain us; of the other four, exhaustion, shock, and complication of injuries, caused 11, gangrene of the stumps, 6, secondary hæmorrhage 4, and diffusive inflammation and erysipelas 4. It is remarkable that of these 25 deaths 22 were from accidents, and 3 from disease—of which three, two were caused by secondary hæmorrhage. It is highly probable that the 16 cases of exhaustion and gangrene mainly owed their fatal termination to the great severity of the accidents which rendered amputation neces-

sary, aided by the severity of the operation.—This is confirmed, first, by the number of hours and days which each case survived the amputation (four did not survive one day, and the longest period is seven days;) and, second, by the part amputated (of the sixteen, fourteen were thigh, two leg.) The diffusive inflammation and erysipelas were probably owing to the severity of the injury, and the air of the hospital. I was surprised to find that so few of the fatal terminations are attributable to these causes: of the four, three were arm, one thigh.

Secondary inflammations.—In this class, besides those pathological states which are almost universally acknowledged to arise from what is usually styled secondary inflammation, I have included "rigours" and "diarrhœa," the former because I have no doubt that the rigours were symptomatic of secondary disease, and the latter because I believed that ulceration of the intestinal mucous membrane causing diarrhœa belongs to the same class of affections. Of the seventy-three deaths, forty-four belong to secondary inflammation, and twenty-nine to other causes, showing that secondary disease exceeds all other causes of death combined, very nearly in the proportion of five to three. Of these forty-four, nineteen were primary, eleven secondary, and fourteen diseased.

As this subject, secondary inflammation, is one of vast importance, I may, perhaps, be excused if I state what appear to me a few facts connected with it. First, as regards their history, I believe they are much more common now than they were thirty or forty years ago. My reason for saying so is, that amputations were then much more successful than they are now, which could not have been the case had these fatal secondary inflammatory diseases been as frequent. If I were asked to assign the probable cause, I should say that it is because those amputations were performed at a much earlier stage of disease, and on patients comparatively in good general health; second, they are infinitely more common in hospitals than private practice. A large proportion of our hospital surgical deaths arises from them, while in private they are rare. The reason here is obvious—the air of the hospital debilitating the constitution. Third, the more severe the person's disease or injury, and the more the system has suffered, the greater is the liability to these affections. This is almost a corollary on the fact just stated. Fourth, the more severe the operation, the more liable is the patient to secondary inflammation. Of the forty-four cases, fourteen were thigh, seventeen leg, two shoulder-joints, and eleven arm. Not one of the amputations of the forearm was followed by secondary disease. I am well aware that these secondary inflammations occasionally follow very trivial operations and injuries. I have lost two cases of fistula in ano from this cause, and more than one injury of the feet and hands, but these were all in hospital, and were probably attributable to the atmosphere. Fifth, there is a strong tendency in surgical disease to localize itself in some important internal organ, especially the lungs; and this is most apt to occur in the feeble and exhausted—in many cases I believe a very short time before death. I believe that a careful examination would show that the majority of those patients who die of discharge and exhaustion exhibit these affections, and that they are most liable to occur when the discharge is most profuse. I am well aware that profuse discharge,* or even an open sore,† is by no means necessary to their formation; but I feel satisfied that a statistical investigation would show that a great majority occur during the continuance of profuse unchecked suppuration. In cases where there was no discharge, and little, if any pus, secreted, I have remarked the presence of lobulated pneumonia without deposit of pus.

I have introduced the above remarks principally with the view of making them bear on what appears to me a retrograde movement in the treatment of stumps of late years becoming fashionable—union by the second intention—a proposal sanctioned by the hope of preventing secondary inflammation after amputations. If the above statements are correct, this method of treatment rests on very false principles, and cannot be too soon reconsigned to that oblivion in which, in Great Britain, it slumbered for so many years. I believe in all cases union by the first intention, by avoiding the risks of a suppurating stump, diminishes "pro tanto" the dangers of an attack of secondary disease.

To this view it is objected that many patients who suffer amputation for disease profusely suppurating, die within a few days of the performance of the operation, apparently in consequence of the sudden check given to the discharge. In a great many of these cases I am convinced that the secondary inflammation existed before the operation, and that it was the failure of strength, caused by these latent inflammations, which induced the surgeon to perform an operation which their presence rendered altogether futile. I do not think we are yet sufficiently alive to the impropriety of amputating after the occurrence of rigors. Almost as certainly as we do amputate our patient dies. We are still less alive to the impropriety of amputating after some symptom previously mild has become suddenly aggravated. It is too much the practice to wait for some occurrence so urgent as to *demand* removal of the limb. Now the very urgency of the symptom, especially if of sudden accession, is often the strongest of all reasons for not amputating, as it too frequently depends on secondary disease, which will certainly destroy our patient whether we amputate or not.—*Lond. Med. Gaz.*

* Case of fistula in ano nearly healed.

† Paterson—abscess of prostate, 18th of July, 1834.